CABEC

California Association of Building Energy Consultants
Building an Energy Efficient California

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Bill Pennington
California Energy Commission
1516 9th Street
Sacramento, CA 95814

RE: 2005 Nonresidential/High-Rise Residential/Hotel/Motel Standards

Dear Bill,

Mike Gabel and I have reviewed the latest draft 2005 Standards for nonresidential and high-rise residential buildings, and forward the following comments to you for your consideration:

1. First, we want to thank you and the Commission for including the following improvements (as compared to the current Standards) in the latest draft :

   - Matching standard DHW system type to proposed system (i.e. central or individual unit system).
   - Elimination of the global Historic Building exemption.
   - Regulation of outdoor lighting.
   - Limiting use of insulation on T-bar (118(e)).
   - Requiring slab insulation for nonresidential buildings with heated slabs (118(h)).
   - Various improvements to the nonresidential Complete Building, Area, and Tailored method lighting requirements.

2. Table 100-A Application of Standards. Currently, envelope compliance is not required for buildings maintained outside the human comfort range (i.e. buildings maintained either below 55 degrees or above 90 degrees). It is important for the envelopes of buildings kept at high or low interior temperatures to be efficient.

   Proposal: Eliminate the exemption from envelope compliance for buildings maintained outside the human comfort range.

3. Definitions Sect. 101(b):
   - "Manufactured Fenestration Product". The definition currently says that this includes knocked-down or partially assembled products. The Standards need a clear differentiation between "factory-assembled" and "site-assembled", because the SHGC ACM is now only acceptable for "site-assembled" products. Also, the term itself is not clear that it stands for factory-assembled products. After all, storefront and curtain-wall are manufactured. I spoke to Tony Rygg on November 1st about this definition, and he

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agreed that it is confusing, both in terms of the name and the reference to site-assembled products.

Proposal: Change the term "Manufactured Fenestration Product" to "Factory-assembled Fenestration Product". The definition language should clearly indicate that this does not include site-assembled products.

- "Retail and Sales". The term "retail" is generally used to describe buildings in shopping centers that typically contain a mix of occupancy types/activities, including merchandise sales, office space (e.g. real estate), and services (e.g. boxing and shipping). The use of the word "retail" in the Standards causes much compliance confusion, as it is used to justify retail lighting allowances for non-retail tenants in so-called "retail buildings".

  Proposal: Eliminate term "Retail and Sales". Define two new terms: "Shopping Center Building" and "Merchandise Sales". Shopping Center Building would be defined as a building that could be occupied by any type of occupancy normally associated with shopping centers. Under the Complete Building and Area Category lighting compliance approaches, unleased space in Shopping Center Buildings would receive the same LPD as office space. Sales area in leased space would be Merchandise Sales use or function, receiving the same LPD as is currently labeled for "retail and sales" in the proposed Standards.

4. Sect. 116(a)2. EXCEPTION 1 to Sect. 116(a)2. Modify language to clarify that exception applies to buildings with less than 10,000 square feet of site-assembled glazing.

   Proposed new words in bold: EXCEPTION 1 to Section 116 (a) 2: Site-assembled vertical glazing in buildings covered by the nonresidential standards with less than 100,000 square feet of conditioned floor area or less than 10,000 square feet of **site-assembled** vertical glazing shall have U-factors determined in accordance with NFRC 100-SB procedures or default values set forth in Appendix I of the Nonresidential ACM Manual.

5. Sect. 118(e). This section includes requirements for frame demising walls. There are no similar requirements for demising ceilings and demising floors. In the ACM rules, demising ceilings and floors are treated as if they are exterior assemblies. Demising ceilings and demising floors occur when they are adjacent to unconditioned enclosed spaces, such as a storage or utility room.

   Proposal: To be consistent, Section 118(e) should include insulation requirements for demising ceilings and demising floors. In addition, the Nonresidential ACM should be modified to incorporate this change.

6. Sect. 118(h) Clarify that the insulation requirement is for slab on grade ("Slab" is not listed in the definitions).

7. Sect. 122. Required Controls for Space-Conditioning Systems. Consider the requirement of ventilation heat/cool recovery in buildings with high ventilation requirements, such as

manufacturing facilities and theatres. Buildings/spaces with limited hours of operation would be exempt from this requirement.

8. Subchapter 4 (page 72). The title implies that lighting is only included as it pertains to nonresidential, high-rise residential, and hotel/motel occupancies. This is not true for exterior lighting. Consider amending the title.

9. Sect. 133 Requirements for Exterior Lighting. Definitions (Sect. 101(b)) includes "Outdoor Lighting", which refers to "exterior lighting". But "exterior lighting" is not listed as a separate term in the definitions. To be consistent, either Sect. 101(b) should define "exterior lighting" instead of "outdoor lighting", or Sect. 133 should use the term "outdoor lighting".

10. Subchapter 5. There are currently no minimum insulation requirements for buildings covered by this section.

    Proposal: Require that High-Rise Residential and Hotel/Motel occupancies be subject to the same minimum insulation requirements as are Low-Rise Residential occupancies (Sect. 150).

11. Subchapter 5. Consider reinstating the insulation requirement for raised concrete floors. This previous mandatory measure was eliminated after a cost effectiveness evaluation. However, CEC staff has informed me that each measure does not individually have to be cost effective. Rather, all required measures evaluated as a whole must be shown to be cost effective. Apartments located on uninsulated concrete raised floors are subject to much inferior comfort and much higher heating energy needs than apartments located elsewhere in a multi-unit building. Reinstating the floor insulation requirement is a matter of equity.

    In this regard, evaluate the requirement of a lower R-value if the insulation is placed between the structural slab and the finished floor, rather than under the slab. Insulation above the slab is much more effective because the floor does not suffer the large edge losses associated with slabs insulated from below.

12. Sect. 141(c)4.C. Metal-framed assemblies. The Standards (perhaps in the NR Manual) needs to provide modeling procedures for the common metal building detail of having batts pinched down between the framing members (vertical or at the roof) and the exterior finish metal panels. This detail results in the batt not being full depth the entire distance between framing members, but instead the batt tapers from full width to virtually no width as it approaches the framing member. To improve thermal performance, some metal buildings employ a thermal block between the framing member, squeezed batt, and metal outside finish. Proper modeling of this assembly should also be defined.

13. Sect. 141(c)5. Solar heat gain coefficients (performance compliance). Either this section should indicate that a default fenestration tables are acceptable, as is noted in 141(c)4.D. for U-factors, or this section should simply reference Sect. 116(a)2. Currently, the

Standards imply that the default tables are not acceptable under the Performance compliance method.

Also, there does not seem to be an equivalent section to 141(c)4.D (fenestration) or 141(c)5 (SHGC) in Section 143 (Prescriptive compliance). Perhaps fenestration does not need to be addressed in 141 any more than it does in 143, and Sect. 116(a) can suffice. Or, both sections 141 and 143 can simply reference Sect. 116(a).

14. Sect. 143(a)5. Windows. The proposal to eliminate credit for less than 10% glass for nonresidential and high-rise residential buildings should be changed to only apply to nonresidential buildings. There is a practical reason to eliminate the credit for nonresidential buildings, as some types of nonresidential buildings, such as warehouses, only have a small amount of glazing. However, multi-family residential buildings that have small areas of glazing ought to get credit for this, to the extent that this improves the energy performance of the building.

15. Sect. 143. Skylight Requirements. Table 143A and Table 143B continue to have different U-factors and SHGCs for different skylight construction. This presents two problems: 1) The designer or builder has often not decided on the type of skylight to be used at the time the energy compliance is analyzed. With a floating target efficiency, a baseline skylight performance cannot be set for a building; 2) If the Title 24 documents assume a plastic skylight, the Title 24 report needs to be revised if the designer or builder later decides to install a more efficient glass skylight. This is an unnecessary disincentive to improving a building envelope.

    Proposal: Establish one set of U-factor requirements and one set of SHGC requirements for skylights, dependent on climate zone and area only. These requirements should be based on what is cost-effective.

16. Sect. 143. Table 143B Window RSHG Requirements. The 2001 standards RSHG requirements were significantly changed from the 1998 standards, especially in coastal zones, where the 1998 prescriptive standard was single-pane clear glass. In developing the 2001 standards, the fenestration cost-effectiveness analysis showed that dual-pane, low SHGC glass was cost effective as compared to the then current single-pane clear glazing. However, CABEC believes that another look at coastal zone SHGC glass requirements is warranted. The current standard restricts winter passive solar heating significantly. A large number of high-rise residential apartments in the coastal zones do not even have air conditioning. It is also true that most hotel/motel occupancy guest rooms do have air conditioning. Further analysis may show that, from an energy efficiency and energy cost standpoint, hotel/motel occupancies should have a lower RSHG requirement in the coastal zones than high-rise residential occupancies. The cost-effectiveness study should factor the amount of air conditioning that is prevalent for the occupancy type in the climate zone studied.

17. Sect. 143. Table 143A Roof/Ceiling U-Factor requirements. Consider a separate U-factor for metal frame roofs. The current requirements are unrealistic for metal buildings.

However, this metal roof frame U-factor would **not** be set as high as the equivalent U-factor for R-19 batt between metal framing, but instead would be based on an improved thermal design – perhaps incorporating thermal blocks between the framing members and the metal finish material, or wrapping the roof framing members in insulation.

18. Sect. 145(a) Nonresidential and Hotel/Motel Service Water Heating. Standard currently allows any certified DHW system to be installed, regardless of energy type. Nonresidential buildings typically have a small hot water need, but keeping a storage tank of water hot with electric heat is wasteful. Hotel/Motel occupancies use large amount of hot water. Providing this with electric DHW is especially inefficient (although probably very rare).

    Proposal: Disallow electric storage DHW systems under the Prescriptive compliance approach. Under Performance compliance, require that electric storage DHW systems be included in the compliance calculations. The Standard water heater energy would be based on a gas-fired system of the same capacity.

19. Sect 146(a) Specific Common Lighting Systems. Adding a new, additional lighting compliance method makes the Standards more complicated, in that there are more choices for designers and energy consultants to assess before selecting a compliance method. The Common Lighting method does not appear to make any appreciable reduction in the amount of work necessary for designers or building inspectors to evaluate compliance. Unless there is strong backing from the lighting design community and CALBO, we would suggest eliminating this compliance method.

20. Sect 146(a), Table 146-A: Clarify that spacing requirement is OC in each direction.

21. Sect 146(b) Table 146-C Complete Building Method L.P.D. Values. The footnote for Retail and wholesale stores should read “For retail and wholesale stores, the complete building method may only be used when the sales area is **70%** or greater of the building space”.

22. Sect 146(c)3.B.iv. Tailored Method General Display Lighting. Under the current language, a floor display allowance would be earned simply by using directional lights. The addition of the general lighting allowance and the general display allowance will allow stores to use inefficient sources for general lighting, even when there are **no** displays. To prevent the use of the general display allowance to simply attain more watts for less efficient lighting, the tailored approach should require that all (or at least 50%) of the general lighting meet a minimum efficacy (such as 40 lumens/watt).

23. Sect 149(a)2.B.ii. "Existing + Addition" approach. The Standards do not indicate whether or not this approach can include mechanical and lighting systems, or only envelope. There are two important reasons to limit 149(a)2.B.ii. to envelope compliance: 1) Allowing credit for improving existing lighting is completely contrary to Sect. 149(b)1.E.; 2) Taking credit for upgrading existing lighting and/or HVAC systems

creates a tremendous hardship on the enforcement agency to determine whether the existing systems were accurately modeled.

Proposal: Clarify that Sect 149(a)2.B.ii. applies only to envelope compliance.

24. Sect 149(b)2.A.ii. What does "altered component" mean? If additional glazing is proposed, there are three (or more?) possible interpretations:
1) Does only the glazing have to meet U-factor and SHGC requirements?
2) Does the glazing have to maximum area criteria as well as meet U-factor and SHGC requirements?
3) Must the entire wall meet the overall heat gain and heat loss requirements?
Unless there a good rationale for 149(b)2.A.ii., it should be eliminated.

25. Sect 149(b)2.B.ii. The current language reads as if it pertains to an "existing + addition" performance calculation, but this clause applies to building alterations, not additions. This section appears to say that you can get credit by upgrading certain areas of a building, and apply this energy “credit” to the “altered” area of a building. There is no way to distinguish which areas of alterations are the originally intended alterations, and which alterations are simply for credit to apply to the other alteration area.

Proposal: Delete Sect 149(b)2.B.ii.

Should you have any questions about the above comments, feel free to contact either myself or Mike Gabel (see contact information below).

Sincerely,

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On behalf of Michael Gabel
CABEC Nonresidential Standards Co-Chairs

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